Fig. 4.—Average seasonal precipitation in California between July 1 and June 30. Isohyets are drawn for each 5-inch difference in rainfall and on the basis of records adjusted to a uniform period of 25 seasons, ending 1919–20. (The topographic base is reproduced from a photograph of the "Stanford Model.")

stations. Where their altitudes are of the order of five to ten thousand feet it would be inappropriate not to recognize this fact by the indication of a probable rainfall well in excess of that known for the surrounding country. An example of such mountain masses is the giant San Jacinto Peak in southern California, rising abruptly some ten thousand feet above the irrigated desert lowland on the east and eight to nine thousand feet above the orange orchards on the west. San Jacinto, permanently snow capped with the exception of two to four months of the year, is the scene of great thunderstorm activity and gives rise to permanent streams which water considerable irrigated tracts. Thus the San Jacinto River and its tributaries alone, constituting the main drainage system for the southwest side of the mountain, in 1918 supplied water for irrigating 9,015 acres.[26] It is evident that a considerable excess of precipitation over that of its surroundings falls upon such a massive peak and upon its attendant mountainous upland lying to the southeast. The problem is to estimate the amount of this precipitation as closely as possible. The following considerations are of importance.

6 (*a*). *Inferences from known rates of change in the amount of precipitation with altitude.*—Known rates of increase of precipitation with altitude furnish a reasonable basis for estimating the amounts of rainfall above the highest station of a given chain. The shorter, in terms of altitude, a chain of stations is, the less reliable are its indications as to the probable rainfall in the rest of the section involved. There are no chains of stations on San Jacinto. However, there are available for different sides of the mountain five rainfall records of varying lengths which give for a considerable range of altitude some idea of the conditions. The town of San Jacinto, lowest of the stations, 1,550 feet in altitude at the west base of the peak, has a 25-season rainfall mean (ending 1919–20) of 13.07 inches. From San Gorgonio Pass, on the northwest, at 2,560 feet, there is a broken record covering the years 1875 to 1888, showing a mean rainfall of 22.67 inches. Near Beaumont, also on the northwest, at 3,045 feet, a 10-year record from 1911 to 1921 shows a mean of 23.24 inches. Hurley Flat, at 3,500 feet, on the north side, had a mean of 21.49 inches for the two years 1919–1921. Idyllwild, at 5,250 feet altitude south of the peak, for the 10 years 1901–1911 averages 27.80 inches annually.[27] These features would appear to indicate that rainfall a little more than doubles in 3,700 feet of change up to the altitude of the highest station on San Jacinto.

Before pointing out the bearing of these figures on the problem of estimating the rainfall above this highest station it will be well to compare the conditions here with those elsewhere in southern California, which also throw light on the problem. Some 35 miles SSW. of San Jacinto Peak, Palomar Mountain, 6,126 feet in altitude, forms the culminating height of an upland for which there are rainfall records of various lengths, which, if reduced to a uniform 50-year period, indicate an increase with altitude as follows:[28]

Altitude	Precipitation
Feet	*Inches*
1,986	21.93
2,800	27.90
2,975	27.61
4,500	32.72
5,350	45.50

These figures would appear to indicate that rainfall a little more than doubles in 3,364 feet change of altitude up to the level of the highest station, which is to say that it increases in approximately the same proportions as on San Jacinto. It is important to note that here the highest station is vertically within 776 feet of the summit of the peak, while on San Jacinto it is 5,555 feet below the summit. Furthermore, both upper stations are below the level of maximum precipitation, as estimated by McAdie for southern California, 8,200 feet.[29] If for San Jacinto we may base a crude estimate of the rate of increase with altitude on the figures for the lowest and highest stations, these indicate that the rate averages approximately 0.40 inch per 100 feet. Assuming that this rate continues up to the altitude of the maximum rainfall, we have 39.60 inches as the precipitation at this level. The rate of increase probably declines, however, though it is impossible to say how rapidly, owing to the scattered location and varying exposures of the stations used in arriving at the estimate. It is believed that on this basis we may safely conclude that not less than 35 inches annually is the average precipitation at the zone of maximum on San Jacinto. It was hoped that a comparison of the vegetative cover on San Jacinto *v.* for instance, that along the Southern Pacific Railway in the Sierra, where the precipitation-altitude relation is pretty definitely known, might aid in estimating the amount of precipitation at the zone of maximum on San Jacinto. But it appears that in this case vegetation is no criterion. Thus the yellow pine which forms one of the major forest types, both on the Sierra and on San Jacinto, thrives under rainfalls ranging anywhere from about 10 inches annually to about 50 inches. Likewise the Douglas fir, of frequent occurrence in stands mixed with yellow pine, also characteristic of the two regions, lives under extremely diverse climatic conditions. Thus in the Puget Sound region it thrives on 100 inches of annual rainfall, and in the Rocky Mountains it is found where less than 15 inches occurs annually.[30] Neither of these trees, therefore, is useful as a precise rainfall indicator.

6 (*b*). *Inference from mean seasonal stream discharge.*—Draining the south and west sides of what may be called the San Jacinto Highland and the Palomar Highland (or, in other words, the sides exposed to the rain-bearing winds) are the San Jacinto and the San Luis Rey Rivers, respectively. Their two drainage areas cover 330 and 325 square miles, respectively. Estimates of the run-off above the main agricultural areas, based on stream discharges, show that for the San Jacinto basin this amounts to 2.76 inches annually and for the San Luis Rey 3.42 inches.[31] With respect to the average rainfalls of the areas as computed on the basis of five records for each, these run-offs stand in the relation of 100 to 86, which is to say that the run-off on the San Jacinto watershed is somewhat greater in proportion to the computed rainfall than is that on the San Luis Rey. This difference seems too large to be due to difficulties in deducing rainfall from run-off. It is, moreover, probably not due to differences in the nature of the land surfaces as affecting the absorption and retention of water. Geologically the two regions are similar, both being made up of originally deep-seated rocks from which run-off is in general rapid. The variation in the vegetative cover according to altitude is much the same in both.[32] Chapparal largely mantles the

[26] Irrigation Requirements of California Lands, Bulletin 6 of Division of Engineering and Irrigation, Department of Public Works, Sacramento, Calif. See Table 8, "Use of Water as Measured on Various Systems," data from Fruitvale Water Company, San Jacinto, and from Lake Hemet Water Company, pp. 129–30.
[27] Ibid., Table 4.
[28] Ibid., Table 4.

[29] McAdie, The Rainfall of California, *loc. cit.*
[30] See Sudworth, George B., Forest Trees of the Pacific Slope, U. S. Dept. of Agriculture, Forest Service, unnumbered bulletin issued October 1, 1908, Government Printing Office, Washington.
[31] Flow in California Streams. Bulletin 5, Division of Engineering and Irrigation, Dept. of Public Works, Sacramento, Calif. San Jacinto River, Table 136. San Luis Rey River, Table 134.
[32] Information from MS. map of vegetative types, furnished by O. E. Baker, Bureau of Agricultural Economics, U. S. Dept. of Agriculture.

slopes up to some 5,000 to 6,000 feet (though locally interrupted by yellow pine beginning at about 3,000 feet). Above the chapparal begins a yellow pine-Douglas fir zone, represented on Palomar by relatively unimportant stands of this type about the summit, and on the San Jacinto by a forest which extends to approximately 9,000 feet. Above this, again, spruce-fir forest occupies the gulches about the three peaks of which San Jacinto proper is the culminating one. It seems as if the run-off in favor of the San Jacinto area, that run-off being the greater in proportion to the computed rainfall, might be ascribed to the fact that while the drainage areas are of almost exactly the same size, and while the rainfall averages given above represent conditions over virtually the same range of altitudes in the two regions, the run-off in the case of San Jacinto Highland is derived partly from a surface extending some 4,500 feet higher than that which culminates in Palomar Mountain. This is in agreement with the figures based on the estimated rate of increase of precipitation with altitude in the region.

6 (c). *Inference from monthly distribution of seasonal run-off.*—Examination of the monthly distribution of the seasonal run-off in the San Jacinto and San Luis Rey Rivers discloses the fact that the San Jacinto has much the steadier flow, as shown by the following Table 5 based for the San Jacinto on data assembled by the Lake Hemet Water Co., and for the San Luis Rey on those of the United States Geological Survey.[33]

TABLE 5.—*Comparison of the monthly distribution of run-off in per cent of seasonal total, San Jacinto and San Luis Rey Rivers*

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
San Jacinto	2.5	2.1	1.6	1.9	2.2	3.9	9.6	17.5	22.0	16.2	14.5	6.0
San Luis Rey	1.0	0.8	0.2	0.7	0.9	2.6	33.9	16.6	24.3	9.7	6.9	2.4

It is evident that the differences shown are due to certain differences in the nature of the two watersheds. That of the San Luis Rey lies entirely below the level at which snow lasts for the major part of the year, with the result that the maximum run-off occurs in January, the month of maximum rainfall. There is even a secondary maximum of run-off in March in sympathy with a secondary maximum of rainfall in March. In the San Jacinto, snow storage and the forest cover above the level of the highest station so far equalize the flow that the maximum is delayed until March and then is but 22 per cent of the seasonal total. Most significant, however, is the fact that in spite of the influence of January rains below the temporary snow line on San Jacinto, which rains are then the heaviest of the year, just as on the San Luis Rey, nevertheless the January run-off in the San Jacinto is only 9.6 per cent of the total, while in the San Luis Rey it is 33.9 per cent. While this is not direct evidence that an increase of precipitation continues well above 5,000 feet on San Jacinto Peak, it strongly favors that assumption.

6 (d). *Actual v. effective precipitation as related to observed run-off.*—It should be borne in mind, also, that the rates of run-off, measured above the beginning of the main agricultural area, represent net results after a certain amount of the ground water supply has been permanently removed by the growth of vegetation, and after an evaporation from the earth's surface which is exceedingly active under the desert conditions of high temperature and great depression of the dewpoint. Though it is equally important to recognize that to some extent even at the high altitudes these desert conditions reduce the amount of precipitation that reaches the ground, nevertheless, tending to neutralize this effect is the fact that at times of heavy local thunderstorms or of general cyclonic rains on the peak, the presence of a cloud cover reduces the air temperature and hence also the rate of evaporation, while the precipitation itself is its own protection against extreme evaporation except on the edges of the rainfall area, because what evaporation there is from the falling rain or snow helps to maintain a high humidity within the passing storm. Thus, during the periods of storm, evaporation losses are far less than the moisture income. In the period between storms, on the other hand, evaporation losses are enormous. Strong winds, high sun, high temperature, low relative humidity, and low pressure conditions at high altitudes all have their effect. These losses affect not only surfaces wet from recently fallen rain and snow, but the previously acquired moisture as well, through evaporation from plant surfaces and from the packed snows of winter. Snow in the gulches near the summit has been estimated to lie 30 to 40 feet deep.[34] Thus an extremely heavy original catch of precipitation may be so discounted that the net result in measured stream discharge effectively conceals the truth about precipitation at the high altitudes.

These considerations would seem to indicate that an increase in precipitation on San Jacinto, from 27.80 inches at 5,250 feet to at least 35 inches at the level of the maximum may be regarded as a certainty. Indeed, there would seem to be strong probability that 40 to 45 inches is nearer the truth than 35. With reference to the drawing of the isohyets on San Jacinto, then, it may be said, in conclusion, that all the evidence points to the advisability of thus indicating the rainfall at the summit.

7. *Summary of the factors influencing the locations of the isohyets.*—To discuss all the details of the considerations which have led to the manner of drawing the isohyets in various mountain regions of the State is not practicable. They included the following items: (1) Known amounts of seasonal rainfall at stations about the base and any evidence they furnish as to increase of rainfall with altitude; (2) latitude, as affecting the precipitation in the region in which the mountain is located, rainfall *in general* increasing from south to north in middle latitudes over west coasts; (3) altitude and the bulk of the mountain mass as affecting the amount of obstruction offered to the prevailing rainy wind, and therefore as affecting the amount of precipitation; (4) the position and height of the mountain range with reference to the position and height of other ranges between it and the ocean which might cause a rain-shadow on the ranges in the lee in case their positions relative to the direction of the rain-bearing winds made that possible.

8. *Character of lines used in drawing the isohyets.*—It remains to point out the reasons for using a different character of line in different parts of the map. Solid lines are used wherever we have United States Weather Bureau data to establish the limiting amounts of precipitation for any area. Thus on mountain slopes solid lines are used to indicate the probable distribution of rainfall up to the highest station, whether there are stations between the highest and lowest or not. The most complete series, which therefore allows the drawing

[33] Tables 133 and 136 in Flow in California Streams, *loc. cit.*

[34] Information from O. E. Baker, Bureau of Agricultural Economics, U. S. Dept. of Agriculture, based on personal experience on the peak.

of the isohyets with the greatest assurance, is that along the Southern Pacific Railroad, as already noted. The other extreme may be illustrated by the isohyets on the low ranges just southeast of Cape Mendocino. Serving the north end of this area are two stations, some 20 miles apart. The base station has a rainfall of 44 inches plus; the upper station, in a valley at an elevation of but 244 feet above sea level, has 82 inches plus. The only other station in this mountain group is some 40 miles away, at 2,000 feet altitude, near the south end of the ranges. It has 84 inches plus. Solid lines have been drawn for the whole group. It may be noted that in this case the relative altitudes of the two last-mentioned stations form no guide to their relative rainfalls, the reason being that while the southern station has the heavy rainfall appropriate to the windward slope of a coast range in northern California, the northern station receives essentially the same amount because it stands close under the lee of an outer range of hills equally well exposed to southerly and southwesterly winds from the sea, the precipitation "spilling over" the crest of the range into the valley beyond.

An example of another sort of treatment is that shown by the isohyets in the tumbled mountain region of the northwestern corner of the State. Here, in an area larger than Massachusetts, only four United States Weather Bureau stations have unbroken records of 10 years or more, ending 1919–20; three more have broken or closed records antedating that season; while the total number of records from Federal, State, or private sources is but 10. Massachusetts, with a topography which, owing to the slight relief, has far less influence on the distribution of rainfall than has that of northwestern California, has 22 active stations but three of which are of less than 20 years' standing. For this California area solid and severely smoothed isohyets indicate the estimated distribution of rainfall up to 50 inches, there being but one station with more than that amount (54 inches plus). There is a broken record covering 30 years for the coast station of Crescent City, in the extreme northwestern corner, indicating a seasonal average there of 70 inches plus. Together with this heavy sea-level rainfall, the facts of the altitudes of the ranges (up to 5,000 feet but largely 1,500 to 3,000), their exposure to rain-bearing winds, and a five-year mean of rainfall of 109 inches plus at Monumental, close to the California-Oregon line, appear to justify the drawing of broken isohyets up to 100 inches.

The third condition under which the isohyets have been drawn is that illustrated by the case of San Jacinto Peak, already discussed, where there are no records of any sort above a certain level. Under this condition broken lines represent extrapolation to whatever extent is thought justifiable in the circumstances.

IV. THE NEW RAINFALL MAP: DISCUSSION

The general relations of rainfall to topography in California have been so often pointed out that it is unnecessary to do so here. The rainfall map itself shows these relations in a clear and striking manner. There are, however, some items of interest which should be alluded to for the purpose of emphasizing certain facts of the distribution which are important from the point of view of agriculture in the State.

1. *The axes of heaviest rainfall in the Sierra and of least rainfall in the Interior Valley.*—Note has often been made of the position of the axis of maximum rainfall at some 5,000 feet altitude on the west slope of the Sierra, and of the importance of this and of the snow above this level to irrigation interests in California. Between this zone of maximum receipt of precipitation and that of maximum use, agriculturally, which is the great Central Valley, lies a zone which is becoming yearly of greater importance to California, a zone where the raising of deciduous fruits is carried on with a minimum requirement of water for irrigation, the rainfalls being of the order of 30 to 35 inches, neither too little nor too much for successful fruit raising. Bright sunshine is abundant, but, because of the altitude (roughly 1,000 to 2,000 feet), the excessively high temperatures of summer found in the valley rarely extend into the zone of deciduous fruits. Winter cold is sufficient to maintain the normal cycle of tree growth and rest. Altogether, this zone owes its increasing significance to a highly favorable combination of factors, not the least of which is the particular regional distribution of rainfall found on the mountain slope of which it occupies a part.

Related directly to the distribution of rainfall on the Sierra is its distribution in the Interior Valley. If one will carefully trace the positions of the 10, 15, and 20 inch isohyets, the fact becomes clear that the increase of rainfall on the east side of the valley begins many miles west of the actual western limits of the Sierra foothills. This westward extension of the rainfall is least marked in the southeastern part of the San Joaquin Valley and gradually increases to a maximum in the region between Stockton and Marysville. The region referred to stands, relative to the inflow of moist air from the Pacific Ocean, opposite the lowest wide gap in the barrier of the Coast Ranges. This gap, together with the area of maximum extension westward of the Sierra influence and the area of heaviest participation on the Sierra itself, are all in alignment from southwest to northeast. Hence it is, in part, that the lowest section of the Sierra forces the heaviest precipitation—aided (to an extent not possible to measure) by the greater frequency with which barometric depressions cross this area with respect to that farther south.

Thus the zone of minimum rainfall in the valley is pushed far to the west of the axis of it, being displaced least in the southeastern end and most in the northwestern third. Supplementing this influence of the Sierra must be recognized the influence of the Coast Ranges in causing a rain shadow in their lee, as already discussed in another connection.

2. *The concentration of the heaviest precipitation on the Sierra Nevada in its northern third.*—The records of the rainfall stations in the Sierra indicate that it is erroneous to picture the precipitation in that region as decreasing gradually and somewhat uniformly southeastward along the range. As nearly as can be determined, a rather sharp distinction should be made between the average amounts of rainfall in the northwestern third (north of a belt including Placerville and the southern end of Lake Tahoe) and the southern two-thirds. Northwest of the belt the rainfalls are of the order of 70 to 80 inches or more; and southeast of it they decrease abruptly to approximately 50 inches, decreasing therefrom southeastward in spite of the increasing altitude of the range. The evidence is to the effect that the decrease is somewhat gradual down to the latitude of Owens Lake, south of which the rainfall drops off rapidly toward the very small rainfalls east of the southern end of the San Joaquin Valley.

3. *The rainfall of the Coast Ranges.*—Another general misconception regarding the distribution of rainfall latitudinally in California is that it declines gradually from the northwest corner of the State along the Coast Ranges to the Mexican line. It should therefore be pointed out, first, that the decline, if one considers coast stations, is far from regular and is even interrupted by pronounced increases; and, second, that for every major range along the outer coast there is observational evidence to show that the mean seasonal rainfall upon it is not less than 30 inches. On the first point the following list (Table 6) of coastal stations, arranged in order from north to south, shows the true conditions:

TABLE 6.—*Rainfall at coastal stations in California*

Station	Mean seasonal rainfall	Length of record
	Inches	*Seasons*
Crescent City	76.17	26
Eureka	44.90	30
Fort Bragg	40.17	17
Fort Ross	53.70	42
San Francisco	22.48	71
Santa Cruz	27.10	42
San Luis Obispo	20.92	51
Santa Barbara	18.66	53
Santa Monica	14.74	34
San Diego	9.70	70

The most striking irregularity is the sharp break in the general magnitude of the amounts between Fort Ross and San Francisco, the former representing the southern end of a zone of precipitation which may be described as ranging from moderate to heavy, according to the orographic control; while San Francisco stands at the northern end of a zone of moderate to light rainfall comprising the southern two-thirds of the coast.

The second type of irregularity is seen in the local increases of precipitation between Fort Bragg and Fort Ross and between San Francisco and Santa Cruz. For each there is an obvious reason in the local orographic control, since both Fort Ross and Santa Cruz stand at the windward foot of a range of mountains that offers pronounced obstruction to the prevailing rainy wind.

From this point it is but a step to the recognition of the fact that the outermost Coast Range, fronting directly on the sea and broken by greater or lesser gaps which afford free entrance of the winds to the interior, has a precipitation which varies, regionally, even more markedly than that of the coastal stations. Every major unit of this outer range is the site of a relatively heavy rainfall. Every gap separating these units is a region of smaller rainfall.

Furthermore, note should be made of the striking difference between the rainfalls of the outer and inner Coast Ranges. Broadly speaking, the inner have half as much as the outer, for they lack the altitude necessary to force much precipitation from a supply of moisture that has already been greatly depleted on crossing the outer ranges.

The longitudinal valleys within the Coast Ranges show contrasts in rainfall with their bordering mountains not less striking than those of the Sacramento-San Joaquin with reference to the Coast Ranges in general and the Sierra Nevada. Beginning at about latitude 39° and extending southeastward to about latitude 36°, a chain of major valleys lies northeast of the outer ranges, and in them the rainfall is of the order of 20 to 30 inches less than on the outer ranges. In them the forests of the outer ranges give way to the grass lands of the valleys, which display an increasingly semiarid appearance from northwest to southeast. Here the summer temperatures occasionally rival those of the Interior Valley. As far as appearances go, the Pacific Ocean might be a thousand miles away instead of the fifteen or twenty, which it actually is. The Salinas Valley, southernmost of the chain and most appropriately named, presents an aridity only less striking than that of the great southeastern deserts in California. Irrigation is the only hope of agriculture; strong, hot winds from the northwest and clouds of drifting dust are typical of its summer climate.

4. *Rainfall gradients in California.*—Taken as a whole, the State is one of steep rainfall gradients, as is a natural corollary of the strong contrasts in topography. Emphasis is usually laid on the steep gradient over the leeward slope of the Sierra Nevada, particularly along the escarpment which extends along much of its length. Pronounced as this gradient is on account of its great latitudinal extent and on account of its steepness, it is far exceeded in steepness by gradients in at least three other localities in the State, all of them on the *windward* sides of mountain ranges. Of these, one is on the Sierra Nevada, another on the Coast Ranges, and the third on the San Bernardino Range in southern California. Table 7 below gives the particulars and expresses the gradients in inches and hundredths of rainfall per horizontal mile.

TABLE 7.—*Steep rainfall gradients in California* [1]

From—				To—				Distance	Rainfall gradient
Station	Altitude	Seasonal record	Mean rainfall	Station	Altitude	Seasonal record	Mean rainfall		
	Feet		*Inches*		*Feet*		*Inches*	*Miles*	*Inches per mile*
La Porte	*5,000*	*25*	*78.58*	*Truckee*	*5,819*	*25*	*24.61*	*49*	*1.10*
Chico	189	49	23.65	Inskip	4,975	13	78.31	24	2.28
Fort Bragg	74	17	40.17	Branscomb	2,000	17	86.54	20	2.31
Redlands	1,352	30	14.55	Squirrel Inn	5,280	16	38.96	12	2.03

[1] The data for a representative gradient in the region of decreasing precipitation east of the zone of maximum in the Sierra are italicized.

TABLE 8.—*Rainfall stations, lengths of records, seasonal rainfall averages, variabilities, departures, and probabilities, for California*

(Long-period stations in italics, with data in bold-face type.)

Station and county	Altitude of station above mean sea level	Number of seasons of record (total)	Average seasonal rainfall (inches) based on total number of seasons	Number of seasons used in deriving the averages based on uniform period (directly or by adjustment)	Average seasonal rainfall (inches) based either on uniform period or on the number of seasons used for adjustment to uniform period	Average seasonal rainfall based on uniform period (directly or by adjustment)	Station by which adjustment was made, where feasible	Average seasonal variability in percentage of average seasonal rainfall (based on number of seasons shown in column 3)	Average seasonal departures in percentage of average seasonal rainfall (based on number of seasons shown in column 5)	Average of seasonal departures above normal (derived as per column 9)	Average of seasonal departures below normal (derived as per column 9)	Percentage probabilities of plus and minus departures of stated amounts							
1	2	3	4	5	6	7	8	9	10	11	12	13							
												0-25		26-50		51-100		101	0
												+	−	+	−	+	−	+	
Aguanga (Riverside)	1,986	12	14.24	12	14.24	13.59	San Jacinto	31.4	21.5	25	18	25	42	8	17	8			
Alturas (Modoc)	4,460	15	12.34	15	12.34	13.04	Cedarville	19.9	19.5	22	17	25	46	13	7	0	0	0	7
Angiola (Tulare)	208	14	6.51	11	6.88	7.43	Visalia	37.6	24.0	22	26	37	18	9	27				
Antioch (Contra Costa)	46	41	12.51	25	12.44	12.44		37.7	29.5	32	27	16	24	22	20	0	8		
Arrowhead Springs (San Bernardino)	2,000	11	22.53	11	22.53	20.86	San Bernardino	25.7	22.0	20	24	37	27	9	18	9			
Auburn (Placer)	1,360	49	33.58	25	33.41	33.41		23.7	23.5	31	26	40	28	12	8	4	8		
Azusa (Los Angeles)	540	23	19.26				Not adjusted to uniform period.	42.7	32.0	29	35	26	4	22	32	4	4	0	4
Bagdad (San Bernardino)	781	17	2.19	17	2.19	1.77	Needles	105.2	85.0	100	70	17	6	6	17	41	12		
Bakersfield (Kern)	394	31	5.50	25	5.63	5.63		30.7	24.0	27	21	20	40	16	16	8			
Barstow (San Bernardino)	2,105	23	4.30	17	4.60		Not adjusted	49.8	34.5	22	57	18	16	12	12	24	12		
Berkeley (Alameda)	320	33	25.74	25	24.99	24.99		28.8	25.0	17	33	44	12	20	20	0	0	0	4
Bishop Creek (Inyo)	8,500	16	8.13	16	8.13		Not adjusted	34.7	60.5	68	53	6	0	13	19	19	37	6	
Blue Canyon (Placer)	4,695	21	65.63	21	65.63		do	30.0	27.0	34	20	10	43	14	14	10	0	0	10
Blythe (Riverside)	268	11	4.34	11	4.34		do	36.9	37.0	34	40	9	9	37	18	9	18		
Branscomb (Mendocino)	2,000	20	84.30	20	84.30	84.22	Ukiah	24.3	19.0	18	20	40	35	5	10	5	0	0	5
Brawley (Imperial)	105	9	2.45	9	2.45	2.21	Indio	62.9	46.5	62	31	11	33	11	11	11	11	11	
Calexico (Imperial)	0	15	2.82	15	2.82	2.41	Mecca	46.2	38.5	45	34	13	26	7	20	20	7	0	7
Caliente (Kern)	1,290	39	10.97	20	11.11		Not adjusted	25.2	27.5	25	29	35	10	10	35	5	0	0	5
Campbell (Santa Clara)	217	23	15.30	23	15.30	15.35	San Jose	45.7	30.5	32	29	18	30	26	13	4	9		
Campo (San Diego)	2,543	31	19.98	21	19.59		Not adjusted	32.0	24.0	25	23	28	33	10	14	10	5		
Camptonville (Yuba)	3,500	13	67.13	13	67.13	77.28	North Bloomfield	32.0	23.5	24	23	31	15	23	8				
Cedarville (Modoc)	4,675	26	13.15	25	13.31	13.31		25.7	19.0	21	17	28	44	16	12				
Chico (Butte)	189	49	23.63	25	24.77	24.77		24.9	19.5	20	19	30	30	8	16				
China Flat (Humboldt)	600	11	44.19	11	44.19	54.40	Eureka	19.3	17.0	17	17	37	27	9	18	0	0	0	9
Claremont (Los Angeles)	1,200	29	18.73	25	17.85	17.85		40.1	29.5	31	28	20	20	24	28	4	4		
Cloverdale (Sonoma)	340	20	41.75	18	40.32	40.35	Healdsburg	34.2	31.5	39	24	11	28	17	28	11	6		
Colfax (Placer)	2,421	46	47.72	25	49.83	49.83		29.8	23.0	20	26	28	16	24	20	0	4	0	8
Colusa (Colusa)	60	36	16.45	25	16.14	16.22	Marysville	35.4	26.0	21	31	40	13	13	20	7	7		
Cuyamaca (San Diego)	4,677	33	38.13	25	37.25	37.25		25.6	23.5	26	21	28	36	4	20	12			
Davis (Yolo)	51	48	17.03	25	17.02	17.02		30.8	28.5	28	29	24	24	24	24	4			
Deer Creek (Nevada)	3,700	13	67.37	13	67.37	77.51	North Bloomfield	32.1	24.0	26	22	23	31	23	23				
Denair (Stanislaus)	126	21	9.40	21	9.40	9.08	Merced	31.5	21.0	22	20	33	19	24	5	0	14	0	5
De Sabla (Butte)	2,500	16	66.31	16	66.31	64.45	Chico	34.7	24.0	24	24	25	25	25	25				
Dinuba (Tulare)	333	11	12.00	11	12.00	13.08	Visalia	21.4	15.5	14	17	46	36	9	9				
Dobbins (Yuba)	1,650	16	43.20	16	43.20	43.65	Nevada City	32.3	23.0	26	26	37	19	19	25				
Downieville (Sierra)	3,150	12	62.15	12	62.15	69.62	La Porte	29.6	21.0	21	21	25	25	25	25				
Durham (Butte)	160	25	24.60	25	24.60	24.60		23.2	20.0	19	21	36	24	16	24				
Edison (Kern)	2,500	16	11.19	16	11.19	10.19	Bakersfield	31.4	29.0	39	19	19	44	12	19	0	0	0	6
El Cajon (San Diego)	482	21	13.91	21	13.91	13.24	San Diego	29.8	25.5	29	22	24	38	10	14	5			
Electra (Amador)	725	16	32.52	16	32.52	35.81	Kennedy Mine	31.3	23.5	21	23	31	31	13	19	6			
Elsinore (Riverside)	1,234	21	13.32	20	13.03		Not adjusted	12.1	25.0	42	28	29	30	5	25	15	5		
Emigrant Gap (Placer)	5,230	40	53.01	15	56.32	57.54	Blue Canyon	28.6	26.0	20	22	27	27	0	27	13			
Escondido (San Diego)	650	23	16.18	23	16.18		Not adjusted	28.6	26.5	30	23	26	35	4	22	13			
Eureka (Humboldt)	64	30	46.56	25	41.21	41.21		20.8	19.5	23	16	20	52	16	8	4			
Folsom (Sacramento)	252	49	24.31	25	24.61	24.61		32.0	25.5	21	30	40	16	8	24	8	0	0	4
Fordyce Dam (Nevada)	6,500	26	68.55	25	66.63	66.63		25.2	19.5	22	17	28	40	12	16	4			
Fort Bidwell (Modoc)	4,640	27	22.16	9	13.25	20.47	Not adjusted (23 years)	21.1	11.0	12	10	38	56	11					
Fort Bragg (Mendocino)	74	20	37.97	16	38.83	40.53	Upper Mattole	28.3	22.0	20	24	31	31	19	12	0	0	0	6
Fort Ross (Sonoma)	100	45	53.21	25	54.63	54.63		24.2	21.5	22	21	28	32	20	20				
Fresno (Fresno)	293	42	9.80	25	9.30	9.30		27.5	21.0	20	22	36	32	16	16				
Georgetown (Eldorado)	2,650	47	57.04	25	55.53	55.53		31.8	24.0	20	22	20	28	24	0	0	0	0	4
Glennville (Kern)	2,500	11	20.36	11	20.36	20.10	Kernville	30.2	28.0	28	28	27	18	18	27				
Gold Run (Placer)	3,222	19	51.83	19	51.83	53.32	Colfax	33.6	21.0	22	20	32	37	16	16				
Grass Valley (Nevada)	2,090	45	52.75	12	52.34	55.55	Nevada City	32.2	24.5	29	20	17	33	25	25				
Greenland Ranch (Inyo)	−178	9	1.91	9	1.91		Not adjusted	66.7	48.5	43	54	22	11	11	11	22	22		
Hanford (King)	249	21	8.59	21	8.59	8.37	Visalia	26.8	18.5	19	18	38	38	10	14				
Head Dam (Yuba)	1,500	13	53.64	13	53.64	58.03	Nevada City	36.4	26.5	26	23	23	31	23	23				
Healdsburg (Sonoma)	52	43	41.52	25	40.76	40.76		31.3	28.5	32	25	12	24	28	28	4	4		
Helen Mine (Lake)	2,750	20	87.20	20	87.20	84.91	Ukiah	34.9	26.0	26	26	25	30	25	20				
Hollister (San Benito)	284	46	13.17	25	13.80	13.80		31.3	25.0	24	26	28	24	20	20	4	4		
Hullville (Lake)	2,250	13	49.55	13	49.55	52.40	Ukiah	34.8	25.0	27	23	23	31	15	23	8			
Independence (Inyo)	3,957	30	4.94	22	4.95		Not adjusted (22 years)	56.1	38.0	45	31	18	27	9	18	5	14	9	
Indio (Riverside)	−20	43	2.80	25	2.98	2.98		42.7	40.0	42	38	24	24	4	12	20	16		
Inskip (Butte)	4,975	13	78.31	13	78.31	79.51	Chico	35.1	24.0	26	22	31	31	8	23	8			
Jolon (Monterey)	960	38	16.46	25	16.98	16.98		42.1	32.5	38	27	8	28	24	20	8	8	0	4
Julian (San Diego)	4,500	21	33.18	11	32.51		Not adjusted					16	36	12	12	12	12		
Kennedy Mine (Amador)	1,500	28	32.87	25	31.14	41.14		25.4	23.0	26	20	28	28	16	28				
Kennet (Shasta)	730	13	61.31	13	61.31	64.71	Redding	24.7	35.5	49	22	8	38	0	31	23			
Kentfield (Marin)	65	32	48.41	25	47.25	47.25		31.3	23.0	21	25	32	20	20	24	0	0	0	4
Kernville (Kern)	2,600	26	10.37	25	10.19	10.19		49.6	32.5	39	26	20	32	8	24	8	4	4	
King City (Monterey)	333	33	11.04	25	11.06	11.06		44.4	35.0	42	28	16	32	12	16	12	12		
Knights Landing (Yolo)	41	30	17.94	25	17.87	17.87		33.2	24.5	24	25	32	20	12	28	8			
Lake Eleanor	4,700	10	39.45	10	39.45	42.38	Westpoint	29.0	24.0	24	24	30	30	20	20				
Lakeport (Lake)	1,450	19	29.55	19	29.55	28.67	Ukiah	33.2	28.5	33	24	16	32	16	21	11	5		
Lake Spaulding (Nevada) (about)	4,500	25	69.34	25	69.34	69.34		31.4	22.0	23	21	24	28	24	24				
La Porte (Plumas)	5,000	26	78.42	25	78.58	78.58		34.5	30.0	31	29	24	32	16	16	8	4		
Le Grand (Merced)	255	21	13.03	21	13.03	12.63	Merced	38.2	29.0	32	26	19	28	14	18	10	10		
Lemon Cove (Tulare)	600	21	15.38	21	15.38	15.06	Visalia	33.5	28.5	38	19	10	48	14	19	10			
Lick Observatory (Santa Clara)	4,209	42	30.26	25	28.35	28.35		27.3	18.5	18	19	36	32	12	16	4			
Livermore (Alameda)	485	49	17.39	25	14.83	14.83		36.0	26.0	27	25	24	24	20	28	4			
Lone Pine (Inyo)	3,728	16	5.70	16	5.70		Not adjusted	28.1	23.0	26	20	31	43	13	13				
Lordsburg (Los Angeles)	1,320	14	21.00	14	21.00	19.24	Sierra Madre	34.5	21.0	24	22	29	14	29	29				

TABLE 8.—*Rainfall stations, lengths of records, seasonal rainfall averages, variabilities, departures, and probabilities, for California*—Contd.

Station and county	Altitude of station above mean sea level	Number of seasons of record (total)	Average seasonal rainfall (inches) based on total number of seasons	Number of seasons used in deriving the averages based on uniform period (directly or by adjustment)	Average seasonal rainfall (inches) based either on uniform period or on the number of seasons used for adjustment to uniform period	Average seasonal rainfall based on uniform period (directly or by adjustment)	Station by which adjustment was made, where feasible	Average seasonal variability in percentage of average seasonal rainfall (based on number of seasons shown in column 5)	Average seasonal departures in percentage of average seasonal rainfall (based on number of seasons shown in column 5)	Average of seasonal departures above normal (derived as per column 9)	Average of seasonal departures below normal (derived as per column 9)	Percentage probabilities of plus and minus departures of stated amounts: 0–25 +	0–25 −	26–50 +	26–50 −	51–100 +	51–100 −	101 +	0
1	2	3	4	5	6	7	8	9	10	11	12	13							
Los Alamos (Santa Barbara)	600	11	17.55	11	17.55	16.33	Santa Barbara	43.7	28.0	25	31	27	19	18	27	9	9		
Los Angeles (Los Angeles)	361	43	15.55	25	14.16	14.16		39.3	29.0	30	28	20	28	24	20	4	4		
Los Gatos (Santa Clara)	600	35	33.10	25	31.61	31.61		40.8	27.0	26	28	32	24	14	12	18	18	12	
Lytle Creek (San Bernardino)	2,250	15	38.44	15	38.44	34.21	San Bernardino	36.3	24.5	23	26	40	20	7	26	7			
Madeline (Lassen)	5,270	12	13.97	12	13.97	15.31	Cedarville	56.5	40.0	53	27	17	42	8	17	0	8	8	
Mariposa (Mariposa)	1,800	12	29.65	12	29.65	31.08	Westpoint	26.8	19.5	22	17	42	17	17	8				
Marysville (Yuba)	67	49	19.60	25	20.78	20.78		26.8	23.5	24	23	20	28	24	20	4	0	0	4
McCloud (Siskiyou)	3,270	9	45.08	9	45.08	55.19	Sisson	27.3	33.0	44	22	0	44	22	22	11			
Mecca (Riverside)	185	15	3.24	15	3.24	2.31	Indio	55.7	45.0	49	41	20	0	13	40	0	13	13	
Merced (Merced)	173	48	10.95	25	11.48	11.48		30.4	23.5	26	21	24	32	16	24	4			
Mesa Grande (San Diego)	3,350	12	30.85	12	30.85	29.80	Cuyamaca	21.7	23.0	24	18	25	42	8	17	8			
Mill Creek (Amador)	(?)	13	43.99	13	43.99	47.62	Westpoint	26.5	22.5	21	24	38	31	8	15	8			
Milo (Tulare)	1,600	22	22.24	22	22.24	21.36	Porterville	35.6	24.5	27	22	32	32	9	22	5			
Milton (Calaveras)	660	32	21.45	25	21.13	21.13		28.1	19.0	21	17	28	36	20	16				
Mojave (Kern)	2,751	37	4.93	19	4.42		Not adjusted	63.4	51.0	59	43	0	16	21	21	11	21	11	
Mokelumne Hill (Calaveras)	1,550	38	31.43	25	31.01	31.01		28.5	22.0	21	23	36	28	12	20	4			
Montague (Siskiyou)	2,450	29	12.14	17	13.24	12.71	Yreka	27.9	19.0	20	18	35	41	6	12	6			
Montgomery Creek (Shasta)	2,500	11	54.08	11	54.08	56.86	Redding	18.9	17.0	15	19	36	36	19	9				
Mount Tamalpais (Marin)	2,375	22	26.80	22	26.80	26.46	Kentfield	26.0	17.0	17	17	32	36	18	9	0	5		
Napa (Napa)	20	37	24.16	19	23.23		Not adjusted	29.3	20.5	17	24	37	11	21	26	0	0	0	5
Needles (San Bernardino)	477	28	4.21	25	4.44	4.44		67.1	56.0	65	47	8	20	4	8	34	28	4	4
Nellie (San Diego)	5,350	14	48.38	11	45.77	43.01	Escondido (23 years)	16.3	20.5	15	18	18	46	18	18				
Nevada City (Nevada)	2,580	56	53.77	25	49.60	49.60		29.5	22.5	20	25	36	20	20	24				
Newhall (Los Angeles)	1,200	38	17.88	20	17.94		Not adjusted	47.7	37.5	30	45	30	10	10	5	20	25		
Newman (Stanislaus)	91	31	10.84	25	10.33	10.33		32.8	27.5	29	26	24	20	16	32	8			
North Bloomfield (Nevada)	3,200	42	53.84	25	54.80	54.80		25.3	23.0	20	26	32	24	24	20				
North Fork (Madera)	3,000	12	35.70	12	35.70	35.49	Fresno	36.7	24.0	32	16	17	50	17	17				
Oakland (Alameda)	36	46	23.85	25	22.75	22.75		29.7	24.0	17	31	52	12	12	24				
Oceanside (San Diego)	60	10	12.86	10	12.86	12.13	Escondido (23 years)	31.0	26.5	32	21	20	40	10	20	10			
Ojai Valley (Ventura)	900	15	24.24	15	24.24	21.06	Santa Barbara	46.2	27.5	33	22	20	40	7	20	13			
Orland (Glenn)	254	37	17.93	25	18.32	18.32		32.7	27.5	31	24	32	8	16	12	8			
Orleans (Humboldt)	520	17	49.24	17	49.24	52.75	Eureka	31.4	17.0	15	19	47	29	0	12	6	0	0	6
Oroville (Butte)	250	36	27.05	25	27.86	27.86		24.8	22.0	19	25	44	24	12	20				
Ozena (Ventura)	3,680	16	17.32	16	17.32	14.76	Santa Barbara	31.0	35.0	35	27	13	25	25	31	6			
Parkfield (Monterey)	2,800	13	17.62	13	17.62	15.62	Paso Robles	43.9	38.5	53	24	0	23	8	38	23	8		
Pasadena (Los Angeles)	827	21	18.57	12	21.46	19.88	Sierra Madre (23 years)	30.2	22.0	27	17	33	50	0	8	8			
Paso Robles (San Luis Obispo)	800	33	16.40	25	16.27	16.27		38.2	28.5	32	25	16	32	20	20	8	4		
Peachland (Sonoma)	190	24	40.69	24	40.69	40.43	Santa Rosa	26.5	25.0	25	25	29	25	8	21	8	0	0	8
Placerville (Eldorado)	1,875	40	42.31	25	39.45	39.45		30.2	23.0	24	22	24	28	20	24	4			
Point Loma (San Diego)	502	16	11.42	16	11.42	10.22	San Diego	20.9	18.5	21	16	21	50	13	6				
Point Reyes (Marin)	490	37	21.04	25	19.78	19.78		27.0	25.0	24	26	28	24	24	20	0	4		
Porterville (Tulare)	464	31	10.20	25	10.42	10.42		26.9	22.0	21	23	40	28	8	20	4			
Priest Valley (Monterey)	2,240	22	20.70	22	20.70	20.01	Paso Robles	31.5	28.5	34	23	18	41	9	18	14			
Quincy (Plumas)	3,400	25	41.84	25	41.84	41.84		39.2	30.0	29	31	24	16	20	24	4	4	0	8
Red Bluff (Tehama)	307	43	25.13	25	24.28	24.28		29.1	24.0	24	24	20	28	28	16	0	4	0	4
Redding (Shasta)	552	45	38.33	25	38.98	38.98		27.7	24.0	25	23	28	40	12	8	8	4		
Redlands (San Bernardino)	1,352	31	14.67	25	13.95	13.95		36.7	28.0	26	30	28	16	16	24	8	4	0	4
Reedley (Fresno)	347	19	11.76	19	11.76	10.27	Fresno	25.6	23.0	24	22	26	26	16	26	5			
Represa (Sacramento)	100[1]	25	25.38	25	25.38	25.38		31.2	26.0	23	29	32	12	16	28	4	0	0	8
Rio Vista (Solano)	35	27	17.30	25	17.94	17.94		34.2	26.0	25	27	32	20	20	28				
Riverside (Riverside)	851	42	11.05	25	10.75	10.75		29.0	30.5	30	31	24	20	12	28	8	0	4	4
Rocklin (Placer)	249	47	21.96	18	24.02	23.70	Folsom	36.4	32.0	32	32	22	17	22	28	6	6		
Rhonerville (Humboldt)	75	19	42.88	19	42.88	44.51	Eureka	21.3	17.0	18	16	32	42	16	11				
Sacramento (Sacramento)	71	71	18.75	25	16.74	16.74		31.8	25.0	20	30	36	12	24	24	0	4		
Salinas (Monterey)	40	47	13.83	25	13.38	13.38		39.0	26.0	29	33	24	32	16	24	4			
San Bernardino (San Bernardino)	1,054	50	16.10	25	15.34	15.34		31.6	26.0	25	27	24	20	20	24	8	8		
San Diego (San Diego)	87	70	9.70	25	9.46	9.46		34.1	26.5	23	30	36	16	8	24	12	4		
San Francisco (San Francisco)	207	71	22.48	25	20.00	20.00		31.7	23.0	22	24	24	28	28	16	0	4		
San Jacinto (Riverside)	1,550	28	12.58	25	13.07	13.07		31.7	22.5	23	22	28	24	20	28				
San Jose (Santa Clara)	95	46	15.08	25	14.60	14.60		39.1	28.5	31	26	20	24	12	20	12	8		
San Luis Obispo (San Luis Obispo)	201	51	20.92	25	21.46	21.46		30.5	26.0	29	23	16	44	24	4	4	8		
San Miguel Island (Santa Barbara)	500	26	14.29	25	14.34	14.34		25.3	33.5	32	35	20	12	16	20	12	12	0	8
Santa Ana River (San Bernardino)	2,850	16	29.65	16	29.65	26.78	Redlands	23.5	25.0	25	25	25	25	19	31				
Santa Barbara (Santa Barbara)	130	53	18.66	25	19.68	19.68		41.5	32.0	35	29	20	20	8	28	16	4	0	4
Santa Clara (Santa Clara)	90	37	16.11	25	15.68	15.68		42.7	29.8	30	24	24	28	16	12	8	8	0	4
Santa Cruz (Santa Cruz)	20	42	24.72	25	27.14	27.14		31.7	24.0	23	25	32	24	12	16	8	8		
Santa Monica (Los Angeles)	110	35	14.99	25	14.52	14.52		35.8	28.0	27	29	24	20	28	24	0	4		
Santa Rosa (Sonoma)	181	32	31.15	25	29.30	29.30		25.5	22.5	22	23	32	28	12	12	4	4	0	8
Seven Oaks (San Bernardino)	5,000	10	28.73	10	28.73	27.06	Redlands	39.0	31.5	25	38	20	40	30	10				
Sierra Madre (Los Angeles)	1,400	23	24.24	23	24.24		Not adjusted	44.3	31.0	35	27	13	31	17	17	13	9		
Sierraville (Sierra)	5,000	11	23.51	11	23.51	24.63	Fordyce Dam	49.3	31.5	40	23	9	46	18	18	9			
Sisson (Siskiyou)	3,555	32	35.39	25	36.07	36.07		26.6	26.5	23	30	32	28	24	4	0	12		
Sonora (Tuolumne)	1,825	32	35.29	25	33.85	33.85		27.1	19.0	21	17	28	40	16	16				
Squirrel Inn (San Bernardino)	5,280	18	33.03	10	43.57	41.01	Redlands	40.4	33.0	44	22	10	40	10	20	10	0	0	10
Stanwood (Butte)	2,140	17	64.83	17	64.83	63.16	Chico	33.4	30.0	32	28	12	29	29	24	6			
Sterling (Imperial)	255	42	2.32	25	2.36	2.36		72.2	70.0	84	56	12	16	8	16	36	12		
St. Helena (Napa)	255	12	34.46	12	34.46	35.74	Santa Rosa	37.7	31.5	35	28	18	36	18	27	9			
Stockton (San Joaquin)	23	53	14.25	25	14.31	14.31		29.9	23.0	20	26	36	24	16	16	4	4		
Storey (Madera)	296	21	9.46	21	9.46	8.87	Fresno	26.9	21.0	21	21	28	28	14	19	5	0	0	5
Summit (Placer)	7,017	50	45.37	25	47.00	47.00		33.5	22.0	21	23	36	28	12	20	24			
Tahoe (Eldorado)	6,230	10	30.72	10	30.72	34.47	Truckee	42.2	25.0	25	25	30	40	20	10				
Tamarack (Alpine)	1,830	17	48.70	14	49.23	51.66	Westpoint	39.5	33.5	48	19	14	50	0	22	14			
Tehachapi (Kern)	3,964	37	10.69	19	9.38		Not adjusted	32.7	35.0	43	27	16	26	11	26	11	5	0	5
Tejon Rancho (Kern)	1,500	11	10.66	11	10.66	9.97	Bakersfield	24.2	20.5	22	19	36	46	9	9				

[1] About.

TABLE 8.—*Rainfall stations, lengths of records, seasonal rainfall averages, variabilities, departures, and probabilities, for California*—Contd.

Station and county	Altitude of station above mean sea level	Number of seasons of record (total)	Average seasonal rainfall (inches) based on total number of seasons	Number of seasons used in deriving the averages based on uniform period (directly or by adjustment)	Average seasonal rainfall (inches) based either on uniform period or on the number of seasons used for adjustment to uniform period	Average seasonal rainfall based on uniform period (directly or by adjustment)	Station by which adjustment was made, where feasible	Average seasonal variability in percentage of average seasonal rainfall (based on number of seasons shown in column 5)	Average seasonal departures in percentage of average seasonal rainfall (based on number of seasons shown in column 5)	Average of seasonal departures above normal (derived as per column 9)	Average of seasonal departures below normal (derived as per column 9)	Percentage probabilities of plus and minus departures of stated amounts							
1	2	3	4	5	6	7	8	9	10	11	12	13							
												0-25		26-50		51-100		101	0
												+	−	+	−	+	−	+	
Three Rivers (Tulare)	870	11	19.53	11	19.53	21.27	Visalia	28.4	23.0	17	29	55	0	9	27				
Truckee (Nevada)	5,819	50	26.13	25	24.61	24.61		34.2	22.0	22	22	36	28	4	20	12			
Towle (Placer)	3,704	30	57.36	15	59.66		Not adjusted	28.4	21.5	19	22	40	26	13	20				
Tustin (Orange)	200	43	13.15	25	12.30	12.30		34.3	30.0	31	29	16	20	20	28	12	4		
Ukiah (Mendocino)	620	43	36.56	25	37.24	37.24		39.6	26.0	29	23	20	24	16	20	4	0	0	8
Upland (San Bernardino)	1,750	20	21.00	16	20.44	17.95	San Bernardino	42.3	31.0	31	31	25	13	19	31	6	6		
Vacaville (Solano)	175	21	25.88	21	25.88	25.48	Rio Vista	31.4	24.5	21	28	24	24	20	14	5	5		
Valley Springs (Calaveras)	673	27	24.33	20	23.86	23.58	Mokelumne Hill	31.0	23.5	21	26	28	20	20	25				
Ventura (Ventura)	50	35	15.94	11	13.46	12.53	Santa Barbara	38.9	30.5	28	27	27	18	9	27	9	9		
Visalia (Tulare)	334	41	9.80	25	9.41	9.41		26.1	19.0	18	20	36	32	16	16				
Warner Springs (San Diego)	3,165	14	18.09	14	18.09	17.14	Escondido	25.7	23.0	30	16	14	50	22	14				
Wasco (Kern)	336	21	6.23	21	6.23	5.97	Bakersfield	35.4	37.5	49	26	14	28	10	33	0	0	10	5
Watsonville (Santa Cruz)	23	30	21.67	21	22.54	21.76	Santa Cruz	36.6	24.0	25	23	29	33	14	14	5	5		
West Branch (Butte)	3,216	13	70.90	13	70.90	75.85	Chico	29.8	26.0	32	20	23	38	8	23	8			
Westpoint (Calaveras)	2,326	26	41.11	25	40.36	40.36		26.9	21.5	21	22	36	32	16	16				
Willows (Glenn)	136	41	16.54	25	17.07	17.07		31.6	28.0	26	30	28	24	16	12	8	8	0	4
Yosemite (Mariposa)	3,945	16	35.10	16	35.10	35.52	Westpoint	29.6	25.0	22	28	37	13	13	31	6			
Yreka (Siskiyou)	2,625	43	17.53	25	18.95	18.97		37.8	27.0	28	32	32	16	4	24	12	4	0	8

NOTES, ABSTRACTS, AND REVIEWS

SEVENTY-FIFTH ANNIVERSARY OF THE ROYAL METEOROLOGICAL SOCIETY

Nature, for May 2, 1925, contains an account of the celebration of this event in London on April 21–22, 1925. The completion by the Royal Meteorological Society of 75 years of continuous and increasing service is an event in which meteorologists of whatever country may well take pride.

The founding of the British Meteorological Society on April 3, 1850, had been preceded by the somewhat checkered careers of two meteorological organizations. The first English Meteorological Society was begun in 1823, Luke Howard being one of the founders and apparently its chief inspiration, for the society died of inanition after Howard's removal from London. In 1836 the Meteorological Society of London came into being. Gradual encroachment of astrological tendencies in the new organization, however, led to the founding of the British Meteorological Society. James Glaisher was its guiding spirit in the early years. He was its secretary from 1850 for 22 years, except for two years during which he was its president. In 1866 the society was granted a royal charter, its members becoming fellows of the Meteorological Society. The organization in 1882 changed its name to Royal Meteorological Society by permission of Queen Victoria.

In conformity with the ideas expressed by [John] Ruskin, the society at first devoted itself to the expensive task of the collection and publication of meteorological observations from a number of stations, chiefly in England and Wales, as well as to the reading, discussion, and publication of original papers. For it will be recalled that in 1850 there was no State provision for meteorology in Great Britain. The results of this work are printed in the Meteorological Record, which was published annually from 1881 until 1910. In 1911 the work was transferred to the State service, the Meteorological Office. Many investigations were undertaken by the society in its corporate capacity and brought to a successful conclusion. Among these may be mentioned the collection of phenological observations from the area of the British Isles and the annual publication of a phenological report in the Quarterly Journal of the society. This enterprise is still vigorously pursued, the whole of the work of observation and compilation being voluntarily given. In 1919 the Scottish Meteorological Society, which had been founded in Edinburgh in 1855, was dissolved, and as many members of that society as so desired were received as fellows of the Royal Meteorological Society. * * *

The anniversary meeting on the afternoon of April 22 was the principal event in connection with the celebration. The president welcomed the four honorary members who were present, namely, Prof. W. van Bemmelen, lately director of the Batavia Observatory; Prof. E. van Everdingen; Prof. H. Hergesell, director of the Aerological Observatory at Lindenberg; and Prof. Th. Hesselberg, director of the Norwegian Meteorological Service and secretary of the International Meteorological Committee.

At this meeting congratulatory messages were read from King George, from foreign meteorological organizations, and from a number of private individuals, among them the venerable Prof. H. Hildebrandsson, now in his 87th year.

Professor van Everdingen delivered the principal address, "Clouds and forecasting weather." He urged the importance to the forecaster of having regularly available current information on cloud movement and on the extent of cloud sheets as affecting the horizontal extent of related temperature inversions and through them the probabilities of rain. He pointed out also the value of halo observations, and referred to the correlation, at de Bilt, Holland, between halo occurrences and subsequent rainfall. In 1922, 70 per cent of the cases of halo were followed by rain, and only 70 out of 200 rainy days were not preceded by halos somewhere in Holland.

Addresses at the anniversary dinner dealt with the aerological observations being carried on by the British Navy by means of pilot and sounding balloons; with events in the history of the society; with the aid rendered by meteorologists to the airship *R 33* in connection with her recent break away from the mooring mast at Pulham during a gale. Professor van Everdingen responded to Sir Napier Shaw's toast, "International meteorology."—*B. M. V.*